

# A PYTHIA 8 Underlying Event Tune For RHIC Energies

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In this talk we will report a new underlying event tune for the PYTHIA 8 Monte Carlo event generator that is applicable for hadron collisions primarily at  $\sqrt{s}$  ranges available at the Relativistic Heavy-Ion Collider (RHIC). This study is the first tuning exercise of the multi-parton interactions/underlying event parameters in PYTHIA 8 utilizing RHIC data at  $\sqrt{s} = 200$  GeV. We compare our new PYTHIA 8 tuned predictions to measurements from RHIC and Tevatron of the mid-rapidity  $\pi^\pm$  spectra, jet sub-structure, Drell-Yan production, and underlying event observables at center-of-mass energies ranging from 200 to 1960 GeV, and also high-energy underlying event data from the Large Hadron Collider. With respect to the default PYTHIA 8 Monash Tune, the new tune shows significant improvements in the description of the experimental data across all center-of-mass energies. Additionally, we explore the validity of PYTHIA 8 predictions for forward rapidity  $\pi^\pm$  in  $\sqrt{s} = 200$  GeV collisions.